# Book of Abstracts

## of the 75th Annual Meeting of the European Federation of Animal Science



**Book of Abstracts No. 34 (2024)**
**Florence, Italy**
**1-5 September, 2024**

## Assessment and distribution of Runs of Homozygosity and their relation to water stress in the Rasa aragonesa sheep breed

*S. Pérez-Redondo[1], C. Calvete[1], M. Joy[1], A. Dominguez[1], S. Lobón[1], J. H. Calvo[1,2]*
*[1] Centro de Investigación y Tecnología Agroalimentaria de Aragón-IA2 (CITA-IA2), Avd. Montañana 930, 50059 Zaragoza, Spain, [2] ARAID, Avd. Ranillas 1-D, 50018 Zaragoza, Spain*

Heat stress and scarcity of drinking water for animals is a characteristic feature in the semi-arid region where the Rasa Aragonesa sheep breed is reared, especially during summer months with high temperatures. The aim of this study was to estimate the number, length, and frequency of runs of homozygosity (ROH) in Rasa Aragonesa ewes and identified genomic regions with a high ROH frequency using the 680k Illumina AgResearch Sheep HD chip. Moreover, we sought to identify ROHs associated to water restriction and heat stress in animals with different response to these stresses. In total, 201 ewes were subjected to total water restriction for 5 days, experiencing heat stress conditions during 55% of the experiment. Blood samples were collected at day 0 and 5 for haematological and metabolite measurements. Wool samples were taken at day 0 and 4 weeks later (28d). Hierarchical clustering was performed based on the variation of the blood and wool traits. The PLINK software was used for quality control (QC), while detectRuns package was used to detect ROH with the sliding-window option and establishing 1 Mb as the minimum length of a ROH. Hierarchical clustering predicted 4 clusters: 1) fat mobilization ewes (n= 56), 2) high-stressed ewes (n= 9), 3) low-stressed ewes (n= 106), 4) stressed ewes (n= 31). Furthermore, two main clusters were found based on low (cluster 1 – 2) or high dehydration (cluster 3 – 4). After genotype QC, 531,212 SNPs were retained. A total of 2130 ROH exceeding 1 Mb were detected in the whole data, with an average number of ROHs and length in each animal of 10.6 and 4.13 Mb, respectively. Most of the ROH were less than 5 Mb (70%). The inbreeding coefficient (FROH) was 0.025. Cluster 3 and 4 showed the highest and lowest average number of ROHs with 11.18 and 8.22 (with an average length of 7.07 and 3.60 Mb), respectively. Nine and 22 regions were found to contain ROH hotspots when analysing the whole dataset, and the high and low dehydration clusters, respectively. Candidate genes that could be related to water stress were identified within these genome regions.



## Economic values for organic dairy cattle production systems in Denmark

*H. M. Nielsen[1], J. Rind Thomassen[2], S. Østergård[3], L. P. Sørensen[2], M. Kargo[1,2]*
*[1] Aarhus University, Center for Quantitative Genetics and Genomics, CF Møllers Alle 3, 8000 Aarhus, Denmark, [2] VikingGenetics, Ebeltoftvej 16, 8960 Randers SØ, Denmark, [3] Aarhus University, Department for Animal and Veterinary Sciences, Blichers Alle 20, 8830 Tjele, Denmark*

Denmark is among the world-leading countries in organic dairy production. However, all breeding material for dairy cows originates from conventional dairy production, where organic cows are selected based on the Nordic Total Merit index. This may be a problem since organic production differs from conventional production in e.g. use of antibiotics, feeding, usage of reproductive technologies such as multiple ovulation and embryo transfer, and prices for feed and milk. If we use cows and bulls selected based on the index for conventional production, we may therefore not obtain the optimal genetic gain from an organic point of view. Implementation of a specific organic breeding goal will also make it possible to market organic products with an organic breeding profile. The aim of this study was to define a breeding goal based on economic models and preferences of consumers, dairy companies, and farmers. In this first part of this study, we defined production systems and traits for organic dairy production. Economic values were derived using the SimHerd bio-economic model, which models a dairy cattle production system in detail. We used data from the Danish Red dairy breed since this breed is already aiming for being suited for organic production in the future. We expect that the organic breeding goal will have more emphasis on climate impact and animal welfare compared to the conventional current one.